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RESEARCH NOTE

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AN IBM 704 COMPUTER PROGRAM FOR POLYNOMIAL COMPUTED POINTS

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We have a program for the IBM 704 computer which will solve a polynomial equation and compute values for a table of timber volumes. The program can be used for a number of similar problems, for example, to construct rating tables. The program computes points for the following equation:

$$
\begin{array}{lllllll}
Y = b_1 & +b_2 X & +b_3 X^2 & +b_4 X^3 & +b_5 X^4 & +b_6 X^5 & +b_7 X^6 \\
+b_8 Q & +b_9 QX & +b_{10} QX^2 & +b_{11} QX^3 & +b_{12} QX^4 & +b_{13} QX^5 & +b_{14} QX^6 \\
\cdot & & & & & & \\
\cdot & & & & & & \\
\cdot & & & & & & \\
+b_{43} Q^6 & +b_{44} Q^6X & +b_{45} Q^6X^2 & +b_{46} Q^6X^3 & +b_{47} Q^6X^4 & +b_{48} Q^6X^5 & +b_{49} Q^6X^6 \\
+b_{50} Z & +b_{51} ZX & +b_{52} ZX^2 & +b_{53} ZX^3 & +b_{54} ZX^4 & +b_{55} ZX^5 & +b_{56} ZX^6 \\
+b_{57} ZQ & +b_{58} ZQX & +b_{59} ZQX^2 & +b_{60} ZQX^3 & +b_{61} ZQX^4 & +b_{62} ZQX^5 & +b_{63} ZQX^6 \\
\cdot & & & & & & \\
\cdot & & & & & & \\
\cdot & & & & & & \\
\cdot & & & & & & \\
+b_{92} ZQ^6 & +b_{93} ZQ^6X & +b_{94} ZQ^6X^2 & +b_{95} ZQ^6X^4 & +b_{96} ZQ^6X^5 & +b_{97} ZQ^6X^5 & +b_{98} ZQ^6X^6 \\
+b_{99} Z^2 & +b_{100} Z^2X & +\ldots\ldots & +\ldots\ldots & +\ldots\ldots & +\ldots\ldots & +b_{105} Z^2X^6 \\
+b_{106} Z^2Q & +\ldots\ldots & +\ldots\ldots & +\ldots\ldots & +\ldots\ldots & +\ldots\ldots & +b_{112} Z^2QX^6 \\
\cdot & & & & & & \\
\cdot & & & & & & \\
+b_{337} Z^6Q^6 & +b_{338} Z^6Q^6X & +b_{339} Z^6Q^6X^2 & +b_{340} Z^6Q^6X^3 & +b_{341} Z^6Q^6X^4 & +b_{342} Z^6Q^6X^5 & +b_{343} Z^6Q^6X^6
\end{array}
$$

For any problem the coefficients B_m, $m = 1,2, \ldots, 343$, are set, giving a specific equation. This equation may then be solved for Y in terms of X, Q, and Z.

The IBM 704 Computer Program has been written to compute values of Y for one (X_i), two (X_i and Q_j), or three (X_i, Q_j, and Z_k) variables. Each variable, X_i, Q_j, Z_k, is associated with a range of values. These ranges are; for X_i, $i = 1, 2, \ldots, 10$; for Q_j, $j = 1, 2, \ldots, L$ where $1 \leq L \leq 25$; for Z_k, $k = 1, 2, \ldots, N$ where $1 \leq N \leq 25$. These ranges may begin with any given value and are incremented by any constant. Any number of problems may be run at one time; each time giving the starting X, Q, and Z with the corresponding increments. This provides an unlimited range for X_i, Q_j, Z_k which would be suitable for plotting.

Both natural log and log to the base ten transformations are optional. Under these options the logarithmic values of Y are printed, followed by their antilogs on the next page.

A copy of the FORTRAN program deck, the BCD program deck, a sample problem, and operating instructions may be obtained by writing to the:

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